



The Rules of the Collegiate Robotic Football Conference

The Rules of Collegiate Robotic Football

This document sets forth rules of the game of Collegiate Robotic Football. These rules are subject to change in accordance with the evolution of the competition. Except as noted below, the competition follows all NCAA rules, including coin tosses, referee guidelines, unsportsmanlike conduct (by either machine or human), late hits, and so on. Referees shall treat the robot Players as humans for the purpose of application of the NCAA rules of collegiate football.

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A. Players and Teams

1. **Overview:** The game is played by two opposing teams, each consisting of remotely controlled robots, referred to as Players, and the people driving them, referred to as Human Operators.
2. **Player Limit:** No more than 8 Players from a Team are allowed on the playing field during a play, i.e. the game is 8-on-8. A [Delay of Game](#) penalty is assessed for having an excess of Players on the field at the beginning of a play.

3. **Field Layout:** Each Team will have a sideline area on one-half of the field (See the Event Layouts document for playing field orientation). The direction of play can either remain the same for the entire game or alternate at halftime depending on CRFC discretion regarding the facility infrastructure and sideline layout. Human Operators controlling the Players and engineers providing service to Players are restricted to their sideline area except as noted in [Rule B.3](#).
4. **Human Interaction:** Humans are not allowed to intentionally touch any of the Players on the field of play except for Field Technicians and operators of specialty robots.
 - a. Each team will appoint a single individual as their Field Technician. The Field Individual on each team will be identified by wearing a blue pinny. Throughout a game the person serving as Field Technician may change as long as the blue pinny follows. The Field Technician is permitted to touch a Player in order to:
 - i. Return a flipped Player back to its feet.
 - ii. Separate 2 Players physically stuck to each other.
 - iii. Flip a switch off and back on.
 - b. The Operator of the Center and the Kicker are permitted to touch a Player on the field in the following situations:
 - i. Placing the ball over the body of the Center or on the floor in front of the center before an offensive play.
 - ii. Placing the ball on the kicking tee before a kicking play and preparing the Player to kick.

Once intentionally touched by a human other than the above circumstances, a Player is considered injured/damaged and cannot participate in the next play unless the team calls a time out. If the play starts with such a player on the field, [Delay of Game](#) penalty results.

5. **Power Requirements:** Locomotion of Players must be DC powered, with a nominal 24V maximum circuit voltage. Other stored energy sources can be used to power Player accessories as long as they are safely engineered. Any lead acid batteries must be sealed.
6. **Human and Robot Safety:**
 - a. Players must have a kill-switch mounted externally on their top surface, easily reached. When activated, the switch disconnects the main power to

the system. Additional details are provided in [Technical Appendix G.2](#).

- b. Every Team must have their own fire extinguisher at every CRFC event.
 - c. A Team will receive two warnings for any runaway robots due to loss of control. These runaway robots will need to sit out for at least 1 play. In the event that the team experiences a third runaway robot regardless of which robot it is, that Player is ejected from the game. Every subsequent runaway will be ejected from the game as well. Note that the Player will be eligible to return for the next game on the schedule if available.
 - d. PPE Regulations at CRFC Events
 - i. Every person within 10' of the perimeter of conference events, or within 10' of robots being maintained is required to wear Z87 safety glasses.
 - ii. Steel Toe Boots and shin guards are highly recommended for all people near to the field of play.
7. **Robot Control:** All Players will be positioned on the field by remote control. Teams may not interfere with the signals broadcast from the opposing Team.
8. **CRFC Node:** The CRFC Node is an electronic board that serves several purposes:
- a. It is used to sense if an upsetting event has occurred and sends a signal to change the robots light colors, allowing the Ball Carrier to avoid being tackled due to purely contact in [Rule E.2](#).
 - b. It is used to identify teams and eligibility via light colors and patterns, using the built in switch or programmatic switching between Home & Away as well as Eligible & Ineligible.
 - c. It is used to provide teams with access to accelerometer data output by the device.
 - d. It is used to tag and identify robots for the Combine, Measurement Checks, and in game statistics.
 - e. It will soon be used to determine fumbles, crossing out of bounds or into the End Zone, and Retained catches.

The CRFC Node is not yet required but can be used if desired by any unit on the field. If used, the CRFC Node must be rigidly mounted in a horizontal orientation to the surface of each Player's base plate.

9. **Uniforms:** Players do not have to wear “jerseys,” but each team must have a unique color prominently displayed on all four sides. The unique color is assigned by the CRFC. This can be executed by bright LED lights, paint, or a covering such as fabric or contact paper; however, a team must choose only one method for all robots on their team. These uniforms will be checked for eligibility at the Measurement Checks prior to the start of play. Please contact the CRFC for your school’s unique color.
10. **LEDs:** Multi-color, high-intensity LED light strips must fully wrap the sides of the robot anywhere above the baseplate.
 - a. If a team is using LEDs for their uniform color, they must use the CRFC Node in order to set their Ineligible Players to the pulsing setting and their Eligible Players to the solid setting.
 - b. If a team is not using LEDs for their uniform color, they must leave the LEDs for their Ineligible Players dark and their Eligible Players white.
11. **CRFC Node Checks:** At their discretion, the referees may verify that any Player has a functioning CRFC Node at any dead ball. If a Ball Carrier goes out of bounds or into the End Zone and the referees determine immediately afterward that their lights are not triggering properly, an [Ineligible Player](#) penalty shall be assessed.
12. **Base Plate Requirements:** A Player's base plate must be solid and made of HDPE not thinner than ½ inch. A reasonable number of clearance holes for component mounts, component clearance, fasteners, wheels, and wires are allowed. The outside of the base plate must be completely ringed with a bumper (specifications in the Technical Appendix) that can be directly contacted from any horizontal direction by another Player’s bumper-covered base plate. This requires that no fixed/permanent part of a Player may protrude beyond the base plate’s bumper.
13. **Stiff Arms:** Stiff-arming is not allowed. Violation of this rule results in stoppage of play, loss of down and 15’. Stiff-arming is defined as the extension of any material beyond the perimeter of the base plate that impedes the ability of an opponent to contact a Player’s base plate and thus block or tackle a Player. If an appendage is deployed by a Player who is carrying the ball, upon simple contact by an opponent with the deployed appendage, the referee will call a touch-tackle and the play will be dead and the penalty enforced.

14. Kicker Specifications: The Kicker will perform a kick by striking the ball with a solid object. Stored mechanical energy may be used to power the device that kicks the ball. Punting and place-kicking (kickoff, field goal and point-after touchdown) are nominally identical. The kicking tee, upon which the ball can be manually placed, can elevate the lowest portion of the ball no more than 3 inches above the playing surface. The kicking tee must be physically separate from the robot.

15. Kicking Notification: When a Team elects to either punt or kick a field goal, it must verbally notify the referee and opponent which action it is taking prior to the placement of the ball on the Kicker/tee.

16. Pre-Game Measurements:

- a. CRFC Node Kick Test - Officials will "kick test" each robot with a CRFC Node to ensure that it is functionally wired. A robot cannot take the field if its LED light does not illuminate during the kick test. The CRFC will have a supply of new devices available for any failure, but it is the responsibility of the team to install a new CRFC Node. Robots without a CRFC Node do not require this test.
- b. Base Plate & Bumper Height – Both the centerline of the base plate and the bumper must be located from 2-13/16" to 3-3/16" (3" plus or minus 0.2") above the playing surface when the unit is at rest. This distance can also be measured at any point during play by a referee, and if the Player is out of tolerance, the Player is no longer eligible to play.
- c. Light Inspection - Each robot with LEDs shall be tested that its light strip fully wraps the base of the robot immediately above the bumper and is clearly visible from all angles and sides. A robot that fails this test will not be allowed to compete.
- d. Quarterbacks, Centers (*that snap off the ground*), Nose Tackles and Kickers can weigh no more than 45 pounds, Centers (*that do not snap off the ground*) can weigh no more than 35 pounds, and all other Robots can weigh no more than 30 pounds.
 - i. A designated Nose Tackle weighing more than 30 pounds must be visibly marked by a minimum 4" x 4" black flag standing entirely above the highest point of the robot (*but still within the 24' height limit*). This allows it to be readily distinguished from a standard Defensive Player during play.

- e. All Players, except the Center and the Kicker, must fit within a 16 inch square, 24 inch tall box at the beginning of any play including the bumpers.
 - i. The Kicker must fit within a 16 inch by 24 inch rectangle, and not be more than 24 inches tall.
 - ii. The Center must fit within a 16 inch by 16 inch square, and not be more than 30 inches tall if attempting to snap from the ground. The Center may reach out from beyond this footprint before a play in order to snap the ball.
- f. Tires must be mounted on rigid, solid, wheels. Plastic is an acceptable material. Foam tires are allowed, but they can be no thicker than 1/2 inch and no softer than 20 Shore. Pneumatic tires are not allowed. Suspensions and shock absorbing systems are not permitted.
- g. Players, other than the center to which this rule does not apply, can have no more than 2 extensible arms consisting only of rotational joints.
- h. No more than two robots per team are allowed to be powered on in the same room as an ongoing game.

B. Player and Ball Positioning

1. Offensive Line Formation:

- a. A team is required to field at least 3 Offensive Linemen (the Center is included in this count) and they must be positioned next to each other on the Line of Scrimmage. They will be indicated by their pulsing lights or lack of lights as defined in [Rule A.10](#).
 - i. Failure to do so results in an [Illegal Formation](#) penalty.
- b. The Offense must have at least 4 Players within 1' of the line of scrimmage at the start of the play. The 4 Players can be anywhere on the field laterally and do include the 3 Offensive Linemen above.
 - i. Violations result in an [Illegal Formation](#) penalty.

2. Defensive Player Positioning:

- a. Exactly 3 defensive Players must line up within 2' of the line of scrimmage; however, are permitted to do so anywhere along the entire

width of the field.

- i. If a Nose Tackle is employed, per [Rule A.16.d](#), it must line up directly across from the Center.
- b. Two additional defensive Players referred to as Rovers may line up anywhere on the defensive side of the ball so long as they are not directly opposite any offensive Player.
- c. The remaining 3 defensive Players must be at least 10' back from the line of scrimmage until the play begins, at which time full rush is allowed.
- d. Violations will result in an [Illegal Formation](#) penalty.

3. Human Operator Positioning:

- a. Offensive Human Operators can enter the playing field between plays to facilitate positioning their Players on the line of scrimmage prior to the snap of the ball. Once the offensive Players are positioned, all but three of the offensive Human Operators must return to their sideline prior to the snap of the ball.
- b. The Human Operator to whom a designed run is intended must not remain on the field. This includes the RB, WR, QB or any other robot who the offense plans to run the ball with.
 - i. Failure to do so, according to the judgment of the referee, results in an [Ineligible Player](#) penalty.
- c. A referee will stand on the hash mark, 10' from the line of scrimmage on the offensive side of the line of scrimmage creating a Safety Boundary. The offensive Human Operators who are on the field cannot move any closer to the line of scrimmage as governed by [Rule G.5.a](#). If the Player with the ball or the ball itself approaches their location, they must make an obvious effort to retreat or leave the playing surface.
 - i. Any Human Operator crossing the Safety Boundary results in an [Offsides Penalty](#).
- d. Defensive Human Operators are restricted to their designated sideline areas at all times.
 - i. This applies to defending Extra Points and Field Goals as well.

- e. On Kickoffs and Punts, only the Human Operator controlling the Kicker may be on the field for the Kicking Team. The Receiving Team may have up to three Human Operators positioned behind the Goal Posts.

4. Spotting the Ball:

- a. After each play, the referee spots the forward progress of the ball with a “toe-spot”, marking the new line of scrimmage.
 - i. If yardage was gained in the previous play, the ball will be toe-spotted at the point of maximum forward progress of the ball.
 - ii. If yardage was lost, the ball will be toe-spotted at the point where the ball was located when the Player was tackled.
 - iii. If the play ends outside of the hash marks, the ball will be spotted on the hash marks closest to the side of the field where the play ended.
- b. The referees shall call forward progress when a Ball Carrier is so held that its forward progress is stopped. The ball is spotted where the Ball Carrier was located at the moment of the whistle.
- c. If the play clock has been stopped, it will restart when the referee has spotted the ball on the field.

5. Center - Ball Interaction:

- a. The Human controller of the Center may reorient the ball on the floor with no penalty as long as the ball does not change position on the field.
 - b. The Center will line up with its leading edge on the line of scrimmage indicated by the referee's spot but may extend a reasonable amount over the ball if the handoff is to occur without human intervention.
6. **First Down:** A first down is realized when a one-third span of the field is covered within 4 plays (See the Event Layouts document for first down lines).

7. **Out of Bounds Specification:** Because its wheels are not easily viewed by the referees, a Player is considered out of bounds when any portion of its footprint crosses the inside of a sideline or endline.
8. **Spot Marking Specification:** Any event in which a robot's position is compared to the Goal Line, Line of Scrimmage, Mid-Field Line or One Third Line will assess once the entire body of the robot crosses the leading edge of the Line. This rule obviates the need for referees to see where the ball is located as it breaks the plane of the Line.
9. **Fumbles:** Loss of the football by a robot shall presumptively be called a fumble unless the fumble is the result of an illegal hit. The team that first touches a fumbled ball gains possession. If the Player who touches the fumbled ball can take possession of it in accordance with [Rule B.11.c](#), that Player may advance the ball.
10. **Extra Point Kicks & Field Goals:** A kicked Point After Touchdown (PAT) is spotted at the 10' mark. A Field Goal is kicked from wherever the ball is spotted by the refs on the previous play.
 - a. The Kicker may position itself as far behind the Line of Scrimmage as desired to avoid a blocked kick.
 - b. The Offense is required to field a team according to [Rule G.3](#).
 - c. The Defense is required to field a team according to [Rule E.1.a](#).
 - d. The play starts upon the first movement of the Kicker.
 - e. The Kicker may choose to kick the ball or if eligible, pick the ball up and run it as a fake kick.
 - f. The Defense is not permitted to cross the Line of Scrimmage at any point during the play, unless the Kicker picks up the football and begins to drive towards the Line of Scrimmage.
11. **Kickoffs:**
 - a. At the beginning of each half, after a touchdown, and after a field goal, the Kicking Team kicks off to the Receiving Team from the one-third field mark of their own territory. The Kicking Team may place the ball anywhere between the hash marks for their kickoff. The clock is started and play is initiated when the Kicker contacts the ball. Human Operator positioning is defined in [Rule B.3.e](#).

- b. On kickoff, the receiving team must line up behind the midfield line or marker.
- c. Recovery of Kicks
 - i. The Receiving Team recovers a kick by being the first Player to touch the kicked ball. If that Player is an eligible receiver and can take possession of the ball before being tackled by an opponent & before a second Player touches the ball, the Player may advance the ball.
 - ii. The Onside Recovery Zone is defined as the space between the Midfield Line and the opposing One Third Line (*not the one they are lined up on*).
 - 1. The Kicking Team may only recover a kick by being the first Player to touch the ball while inside the Onside Recovery Zone. Players on the Kicking Team are not allowed to advance the ball in the event of retention.
 - 2. If the Kicking Team makes contact with the ball outside of the Onside Recovery Zone, it will be a Dead Ball and possession will be given to the Receiving Team at that spot.
- d. On kickoff, if a ball is kicked out of bounds, the receiving team has the option to: (1) take possession of the ball from the point on the field where the out of bounds occurred, or (2) take possession of the ball at the midfield line. If a kicked ball crosses the plane of the Goal Line, the Receiving Team takes possession of the ball at the one-third field mark of their territory.

12. Punts:

- a. On a punt, the Defense cannot rush the kicker. The Team receiving a punt will take possession at the point where one of its Players touches the ball. If that Player can take possession of the ball in accordance with the same standards as [Rule B.11.c.i](#), the ball may be advanced. If the ball goes out of bounds, it is spotted at the point it goes out of bounds.
- b. On a punt, if the ball crosses the plane of the Goal Line into the End Zone at any point and then comes to rest prior to coming into contact with any Player, or if the ball is punted out of the back of the End Zone, the Receiving Team takes possession of the ball at the one-third field mark of

their territory. However, the Receiving Team does have the option of taking possession of the ball in the End Zone and advancing the ball in accordance with the same standards as [Rule B.11.c.i.](#)

13. Kicking Play Operation:

- a. Kicker Ball Placement: After the kicker has been driven remotely to the final kicking position without being manually carried, the kicking team may elect either option:
 - i. Human Operator may place the ball on the kicking tee, manually release any safety mechanism, and then move the kicker remotely 5' to the final kicking position. The Human Operator may remain on the field offset behind the Kicker at a distance.
 - ii. Human Operator may first drive the robot 5' into its final kicking position, place the ball without touching or moving the robot, and then remotely release any safety mechanism. The Human Operator may remain on the field offset behind the Kicker at a safe distance.

Either option above prohibits all human-to-robot physical contact after the robot has been remotely moved to its final position. If human-to-robot contact is detected either in carrying onto the field or after setting the ball, the referee shall call a [Delay of Game](#) penalty.

- b. The referee initiates any kind of kicking play by blowing a whistle following an indication from the kicking team's coach that the Kicker is ready.

C. Game Timing

1. Pre-Game Activities:

- a. Before every game, a coin toss will take place at midfield involving the referees and at least one representative from each team.
- b. Before the Championship Game, the singing/playing of the national anthem will take place prior to the coin toss.

2. **Overall:** The game consists of two 15-minute halves and a brief halftime (5-10 minutes). All games must be finished within 1 hour and 15 minutes of actual time. The game clock is subjected to the following guidelines:

- a. The running clock only stops after touchdowns, field goals, changes of possession, or timeouts called by either team or the referee. The clock

restarts on the referee whistle.

- b. During the final two minutes before the end of either half, the clock shall also stop after running out-of-bounds, incompletions, penalties, turnovers, or first downs. The clock restarts on the referee whistle after first downs and penalties, but the clock will restart when the ball is snapped in all other cases.
 - c. **NOTE:** In order to keep on schedule, the Officials have authority to switch to a full running clock (can only be stopped by timeouts) for the remainder of the game in the event that either team is inefficient in their use of time during the first half.
3. **Play Clock:** The offense has 40 seconds, indicated by the play clock, from the time the referee spots the ball to initiate a play.
- a. **Offense:** The ball must leave the Center's control before the 40-second play clock expires. If the play clock expires before a hand-off is complete, a [Delay of Game](#) penalty will be assessed.
 - b. **Kicking:** The ball must be kicked before the 40 second play clock expires.
 - i. **1st Offense:** If the play clock expires before the ball is kicked and the Player is in position attempting to kick, a traditional [Delay of Game](#) penalty will be assessed.
 - ii. **2nd Offense:** If a second consecutive violation occurs or the Player is not in position attempting to kick, the play will be blown dead and the ball will be turned over.
 - 1. **FG Attempt:** Treated as a Missed Field Goal
 - 2. **PAT:** Treated as a Missed Extra Point
 - 3. **Kickoff:** Receiving Team takes possession at Midfield
 - 4. **Punt:** Receiving Team takes possession at the current spot of the ball
4. **Play Initiation:** Plays that begin in the possession of the Center are initiated the moment the Center releases the ball (not simply moves it).
5. **Timeouts:** Each Team is allowed 2 timeouts per half. Any member of a team may call a timeout, by saying "timeout," forming a "T" with their hands, and showing it to the referee. Each timeout lasts 1 minute. The 40-second play clock is started after the 1 minute has expired.
- a. If a team calls a timeout after all timeouts have already been used, a [Delay of Game](#) penalty will be assessed.

6. **Overtime:** In case of a draw at the end of the game, NCAA rules for overtime are observed with each offense taking possession at the one-third line.

D. Offense

1. **Eligibility:** All Players with bright solid LEDs are eligible to be a Ball Carrier.
 - a. **Illegal Robot Downfield:** An Ineligible Receiver (defined in [Rule A.10](#)) may not materially cross the line of scrimmage on a pass play until the ball has crossed the line of scrimmage. Failure to comply results in an [Ineligible Player](#) penalty.
 - b. **Ineligible Receiver:** If an Ineligible Receiver (defined in [Rule A.10](#)) retains a forward pass, an [Ineligible Player](#) penalty shall be assessed against the Offense.
 - i. Simple contact with an Ineligible Receiver, is considered a deflection and will not be penalized.
2. **Snapping:** The Offense is required to start every play with a snap of the football, either on or off the ground, from a robot lined up where the referee spots the football.
3. **Returning Ball to Referees:** After each play, a Referee must be able to remove the ball from any Player without touching that Player or lifting that Player off the ground so as to spot it for the start of the next play. This rule does not apply to Quarterbacks unless the Quarterback advances the ball by rushing past the line of scrimmage, and it does not apply to Kickers or Defensive Players who do not advance the ball following a turnover. If a referee cannot freely access the ball, after one warning per half, that Player will be ejected from that game only.
4. **Pass Catch Definitions:**
 - a. A pass is caught when any part of a Player contacts the ball before the ball touches the ground, this is referred to as a Touch Catch.
 - b. If that Player retains possession of the ball the Player can advance the ball, this is referred to as a Retained Catch.
5. **Scoring Kick Results:**
 - a. A field goal or kicked PAT is scored when the kicked ball passes over the goal post crossbar and between the goal posts.

- b. If a field goal attempt is missed, the defending team takes possession of the ball at the point of the field goal attempt.
- 6. **Wildcat Plays:** A Running Back or Wide Receiver may receive the ball directly from the Center (effectively running a Wildcat play) as long as the Quarterback is not replaced on the field of play with a different robot.
 - a. Violations will result in an [Illegal Formation](#) penalty.
- 7. **Restrictions on Quarterbacks, Centers and broken robots:**
 - a. Offenses are restricted to 1 Quarterback and 1 Center on all plays.
 - b. Defenses cannot use Quarterbacks or Centers on any play except as a Nose Tackle pursuant to [Rule A.16.d](#).
 - c. Teams that are unable to field a full set of 8 robots are permitted to still compete but are limited to the number of legally available Players that are safe to operate.
 - d. A Team that is unable to field a Quarterback may continue to play using a Wildcat formation without a Quarterback on the field. In this situation, the Team must reduce its total number of Players on the field to no more than seven.
 - e. See [L. Missing Robot Scenarios Appendix](#) for examples of application.
- 8. **Time Management Plays:** When an offensive Human Operator yells “KNEEL”, the ball will be called down by the refs with the clock running. Likewise, when an offensive Human Operator yells “SPIKE” the refs will stop the clock as if the offense threw an incomplete pass. All Time Management Plays require the offense to be in a legal formation.
 - a. Violations will result in an [Illegal Formation](#) penalty.

E. Defense

1. **Tackle Rule:** A tackle is defined as a triggering of the Ball Carrier's CRFC Node lights and contact by a Defensive Player. If there is no CRFC Node installed on the Ball Carrier (signified by white running lights), a tackle is simply defined as contact by a Defensive player. Alternatively, a robot will be tackled when their forward progress is stopped per [Rule B.4.b](#).
2. **Interceptions and Deflections:** Passes contacting the Defensive Players will be considered deflected and not intercepted unless the Player retains the football. In this scenario, the Player can advance the ball.
3. **Pass Interference:**
 - a. No significant contact is allowed between the offensive pass receiver and a defender, where "significant" will be judged by the Referees to mean anything that impedes the free movement of either Player. The Player initiating the significant contact will be charged with pass interference. Pass interference penalties will only be called on plays in which the ball is thrown by the Quarterback, so run blocking that results in a tackle will not constitute an interference penalty.
 - i. Interference conducted by the Defense will result in a [Defensive Pass Interference](#) penalty.
 - ii. Interference conducted by the Offense will result in an [Offensive Pass Interference](#) penalty.
 - b. A Defensive Rover cannot initiate contact with any Wide Receivers inside the 10' buffer zone. Any contact initiated by the Defensive Rover or caused by their positional alignment will result in a [Defensive Pass Interference](#) penalty.
 - i. Any Offensive robot that is Eligible (defined by [Rule A.10](#)) and positioned less than 2' away (measured horizontally) from an offensive lineman will not be considered a Wide Receiver and will be considered a Tight End. A Defensive Rover will not be penalized for initiating contact with a Tight End inside the 10' buffer zone.

F. Scoring

1. **Football Points:** These are the points that a team can score which reflect the traditional points scored in NCAA collegiate football.
 - a. Touchdown - 6 points
 - i. This is scored by carrying possession of the ball into the opposing team's End Zone.
 - b. Kicked PAT - 1 point (*Point after Touchdown*)
 - i. This is scored by kicking a ball through the goalposts after scoring a touchdown.
 - c. Converted PAT - 2 points
 - i. This is scored by carrying possession of the ball into the opposing team's End Zone on the PAT attempt.
 - d. Field Goal - 3 points
 - i. This is scored by kicking a ball through the goalposts on any regular down prior to scoring a Touchdown.
 - e. Safety - 2 points
 - i. This is scored by the Defense tackling the Offense within the Offense's own End Zone.
2. **Robot Points:** These are the unique points that a team can score through CRFC Innovation Challenges. There are no caps/limits to the amount of Robot Points that can be earned in a game except for those explicitly mentioned below. All Robot Points on any one play are additive.
 - a. Short Completed Pass - 2 points
 - i. This is scored by completing a pass by either Touch Catch or Retained Catch between 0'-10' downfield through the air.
 - b. Long Completed Pass - 3 points
 - i. This is scored by completing a pass by either Touch Catch or Retained Catch greater than 10' downfield through the air.
 - c. Retained Catch - 1 point & Automatic First Down
 - i. This is scored by a Wide Receiver completing a Retained Catch anywhere beyond the Line of Scrimmage as defined by [Rule B.8](#).
 - d. Snap from the Ground - 1 point per Drive
 - i. This is scored by a Center snapping the ball from the ground

directly to a Ball Carrier to begin the play.

- e. Attempted Pass - 1 point per Drive
 - i. This is scored by the Quarterback throwing the ball in a forward direction past the Line of Scrimmage towards an Eligible Offensive Player. No points are assessed in the case of Intentional Grounding as defined by [Rule G.6](#).

G. Additional Offensive and Defensive Penalties

1. **Offsides Penalty:** There is a 4" neutral zone on either side of the line of scrimmage. The only Player allowed in the neutral zone before a play is initiated is the Offensive Center.
 - a. A Lineman who enters the neutral zone prior to the snap, even if no contact is made with the opponent, is assessed an [Offsides](#) penalty.
2. **False Start Penalty:** All Offensive Players are required to come to a complete stop prior to the snap beginning unless they are legally in motion.
 - a. If any player on the Offense begins to illegally move prior to the snap, a [False Start](#) penalty shall be assessed.
 - b. If the Center retains the ball after the first attempt to snap it to the intended Player, a [False Start](#) penalty shall be assessed.
 - c. If the Center is jiggling or otherwise moving to finish the handoff to the QB, a [False Start](#) penalty shall be assessed.
3. **Illegal Hit Penalties:** The following circumstances will result in an [Illegal Hit](#) penalty:
 - a. General Roughing: This penalty occurs when the offended Player is physically damaged. **NOTE:** The Officials have authority to disqualify an equivalent Player on the offending team or require the offending team to forfeit the game in extreme situations (e.g. continuous targeting and destruction of opposing robots).
 - b. Roughing the Passer/Kicker: After the ball is released by the Quarterback/Kicker, there may be no significant contact between the Defense and the Quarterback/Kicker as result of the motion of the Defensive Player.
 - c. Loss of Control: A Player has been driven at full speed into a barrier or wall or the referee determines that a Player has been operated without regard to safety. Intent does not have to be established. This Player is also

issued a warning and subject to [Rule A.6.c](#).

4. **Unsportsmanlike Conduct Penalties:** Taunting or verbal abuse by humans will not be tolerated. The first offense results in a warning to the individual. A second offense results in a 20' penalty and final warning. A third offense results in immediate ejection from the game. Referees and CRFC officials retain the right to immediately eject a player by their discretion.
5. **Safety Violation Penalties:** To protect the Human Operators on the field, an [Offsides](#) penalty will be assessed under the following safety violations:
 - a. Any of the Human Operators on the field or any robot crossing the Safety Boundary shall be called for a Safety Violation. (See [Rule B.3](#))
 - b. If a Defensive Player gets closer than 5' to an Offensive Human Operator on the field, the Defense shall be called for a Safety Violation.
 - c. If Human Operators on Offense venture into the Defensive side of the ball, thereby interfering with the defensive Players, the referee shall first issue a warning. If occurring a second time, the Offense shall be called for a Safety Violation.
 - d. If Human Operators fail to clear the area when the ball comes near their area of the Safety Boundary, the Offense shall be called for a Safety Violation.
 - i. Note that Human Operators are allowed to move behind the goal posts in order to clear the area.
 - e. If any sideline Human Operators are found extensively in the White Zone, defined as the 3' section along the sidelines, the referee will at their discretion first issue a verbal warning, followed by the [Offsides](#) penalty.
6. **Intentional Grounding Penalty:** On a pass attempt by the Offense, the Quarterback must truly attempt to pass the ball to an Eligible Offensive Player.
 - a. If the pass intentionally does not cross the Line of Scrimmage or does not target the vicinity of an Eligible Offensive Player, an [Intentional Grounding](#) penalty is assessed.

H. Technical Appendix

1. **Football:** Robotic Football games, competitions, and events are played using a Micro Mini Football, which shall be inflatable, measure 6-7" in length, and not be made of hard plastic or solid rubber. The ball may not be significantly modified and must be pressurized within the range stated on the ball. For CRFC competitions, standard footballs will be provided for both teams to use. Referees may confirm that the ball is unaltered and properly inflated at any dead ball.
2. **Kill Switch:**
 - a. It is recommended that you use a lever type battery cut-off switch made for automotive applications, though push-button switches are allowed. The kill-switch must be readily identifiable and colored red. A good example can be found at <http://www.pegasusautoracing.com/productdetails.asp?RecId=4913>.
 - b. The switch cannot have a removable key, such as in the kill-switch found at <http://www.pegasusautoracing.com/productdetails.asp?RecID=1465>.
3. **Base-Plate Bumper Material:** This will consist of a hollow bulb P-strip of extruded Ethylene Propylene Rubber (EPDM) acquired from Wefco Rubber Manufacturing Company, Inc. The part number is #4134, and the detailed dimensions can be found at http://wefcorubber.com/extrusions_industrial_pstrips.asp.

The nominal stem thickness is 3/32 inch, and the nominal bulb diameter is 9/16 inch. The stem of the bumper must be bolted in a rigid fashion to the top or bottom of the base plate such that the hollow bulb is in direct contact with the ½-inch thick outside surface of the base plate. In this way, the hollow bulb will be the contact material for any contact with other Players. Bolts must be placed at least every 3.25 inches as measured along the perimeter of the base plate and may not be threaded directly into the base plate (thru holes and nuts must be used).
4. **Artificial Intelligence:** The use of artificial intelligence is permitted, subject to the limits and requirements of each participating university's applicable policies.

I. Field Layout

1. The Playing Field:

- The game will be played on a field 90' long and 46' wide, as shown in Figures 1a & 1b (94' by 46' is acceptable if playing on a conventional NCAA basketball court). End zones extend 12' past the goal lines for a total area needed of 48' x 114' (10' past the goal lines on a 94' field). From end to end, the playing field is divided laterally into three equal sections. Hash marks are spaced 5' apart on either side of the center line for spotting the ball. The center of the field is marked with an "X" and a uniquely colored line across the field. The place at which a PAT is attempted is at the 10' line. There shall be a buffer between the sidelines and any spectators of at least 5 feet, along with any appropriate barrier.

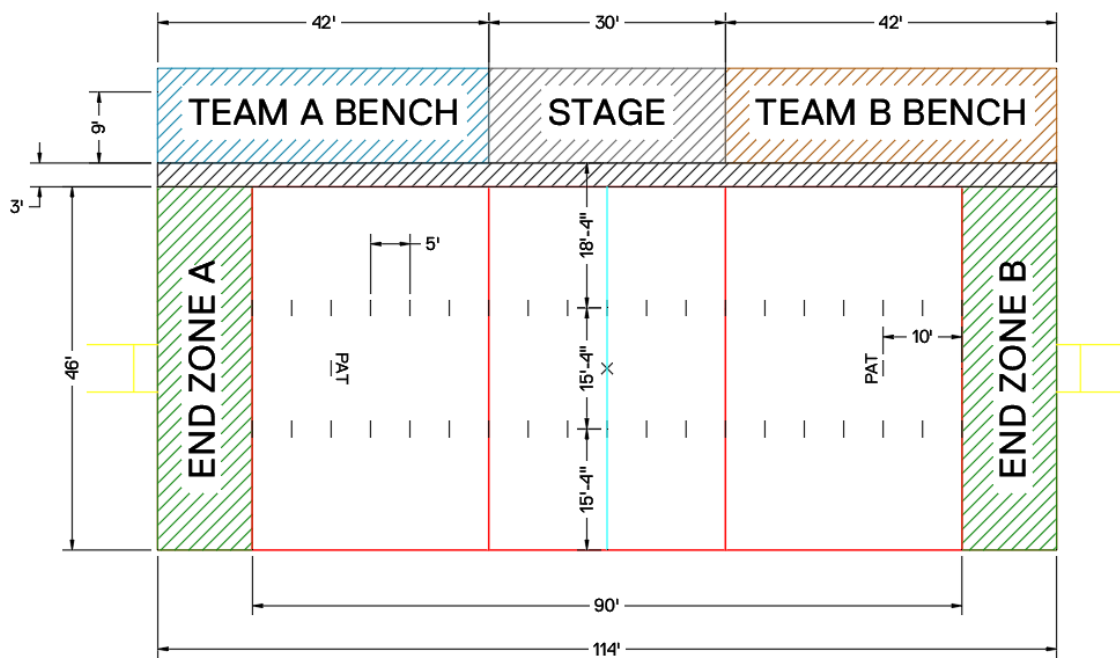


Figure 1a: 46' x 90' field. A brightly colored tape is used to line the field. The depth of the team benches and stage are approximate. The goal posts are placed at the back of the end zones.

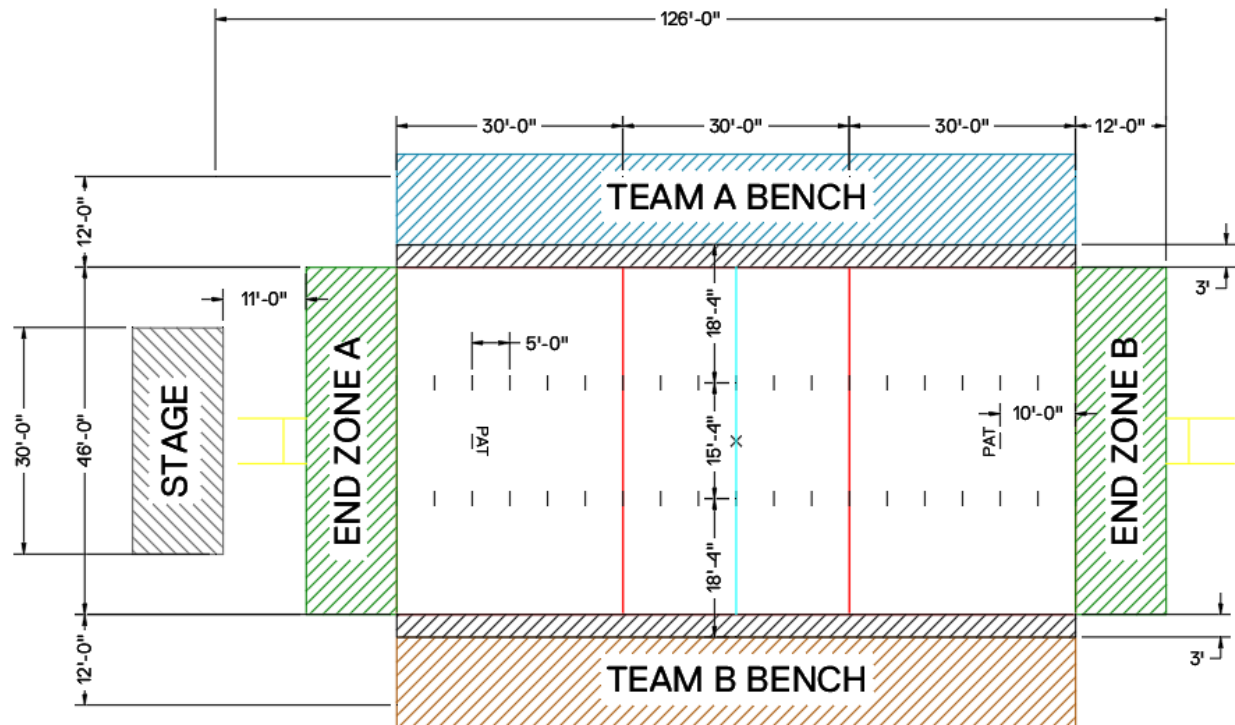


Figure 1b: Alternate 46' x 90' field. A brightly colored tape is used to line the field. The depth of the team benches and stage are approximate. The goal posts are placed at the back of the end zones.

2. The Goal Posts:

- a. The goal posts are to be nine (9) feet tall (8 feet is acceptable when justified by transportation requirements), six (6) feet apart from each other, and with a cross bar that is three (3) feet above the ground. The goal posts are toward the back of each end zone.

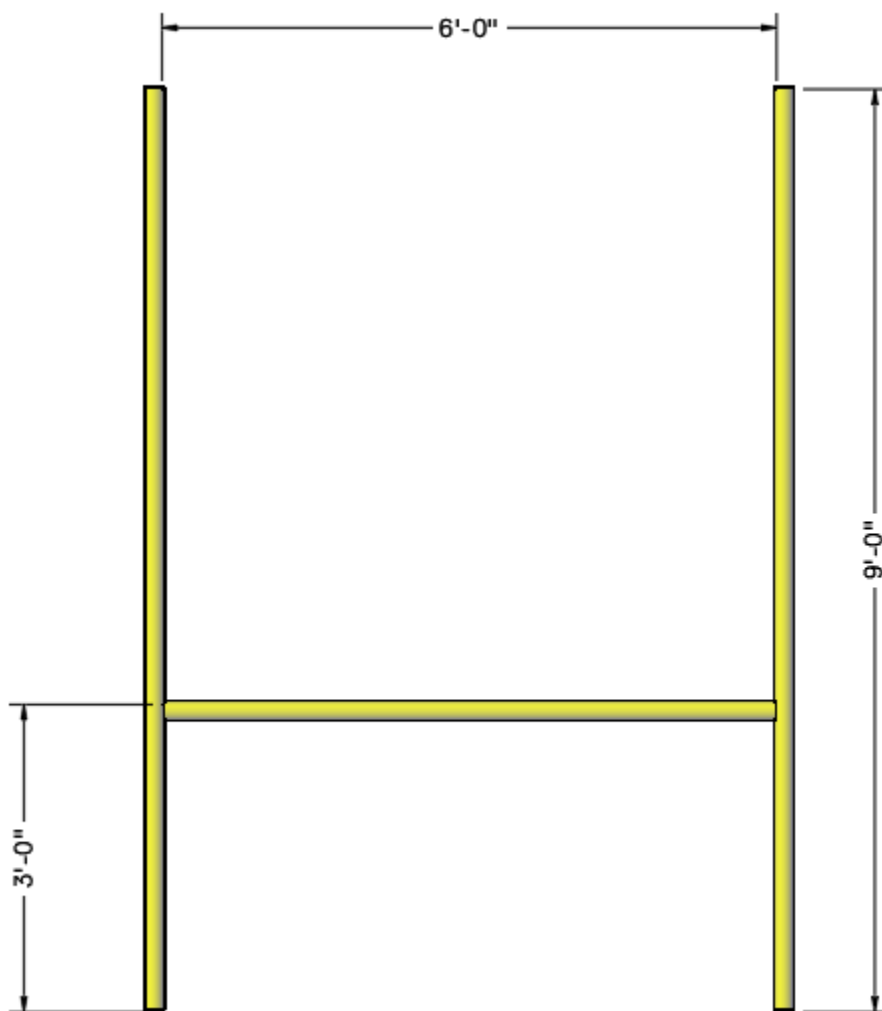


Figure 2: Goalpost Dimensions. Any pipe or tubing can be used that stays standing and meets the dimensions as shown above.

J. Glossary of CRFC Definitions

1. General

- a. The **Collegiate Robotic Football Conference (CRFC)** is the governing entity that operates and defines the sport of Robotic Football.
- b. The **Offense** is defined as the team who has possession of the ball prior to the snap.
- c. The **Defense** is defined as the team who does not have possession of the ball prior to the snap.
- d. The **Kicking Team** is defined as the team who kicks the ball for the play.
- e. The **Receiving Team** is defined as the team opposite the Kicking Team for the play.
- f. A **Player** is defined as a remotely controlled robot in the field of play.
- g. A **Human** is defined as the person remotely controlling a robot in the field of play.
- h. **Footage** refers to the distance on the field and mirrors the use of Yardage in NCAAAF.
- i. The **Coin Toss** is defined as the event to begin the game where the ref flips a coin, the away team calls the result, and the winner gets to choose whether they want to kick or receive the ball to start the game or if they want to defend the Left or Right End Zone.

2. Eligibility and Tackling

- a. A **CRFC Node** is defined as the electronic board that determines when a player has been tackled, whether they are Eligible or Ineligible among other things defined in [Rule A.8](#). This board is provided to teams by the CRFC to ensure consistency between teams.
- b. An **Eligible** player is one who is eligible to carry the ball and is indicated by bright solid lights.
- c. An **Ineligible** player is one who is not eligible to carry the ball and is indicated by either no lights or pulsing lights.
- d. An **Upset Event** occurs when a Player's Status Lights turn red by the control of the CRFC Node.
- e. **Player Status** is either tackled in an Upset Event or not tackled.
- f. **Status Lights** are defined as the lights used to indicate Player Status which are driven by the CRFC Node.
- g. A **Ball Carrier** is defined as a player capable of carrying the football down the field. All Ball Carriers are required to be Eligible players.
- h. A **Tackle** occurs when a Ball Carrier in possession of the ball receives contact from the Defense and an Upset Event occurs or without the use of

a CRFC Node simply when the Ball Carrier in possession of the ball receives contact from the Defense.

3. Field Markings

- a. The **Onside Recovery Zone** is defined as the space between the Midfield Line and the opposing One Third Line on kicking plays.
- b. The **Line of Scrimmage (LOS)** is defined as a line running from sideline to sideline that is even with the placement of the ball prior to the snap. Neither team is permitted to cross this line until the snap is completed.
- c. The **Neutral Zone** is defined as the 4" space on either side of the LOS.
- d. The **Secondary Offset Line (SOL)** is defined as 10' behind the LOS on the Defensive side of the ball.
- e. The **Safety Boundary** is defined as the area 10' behind the LOS on the Offensive side of the ball which human operators cannot cross without penalty during a live ball situation.
- f. The **End Zone** is at each end of the field as defined in the CRFC Events Layout. Each team has their own End Zone to defend behind their direction of travel as determined by the Coin Toss.
- g. The **Goal Line** is defined as the line along the leading edge of the End Zone closer to midfield.
- h. The **One Third Line** is defined as the line that marks one third of the distance of the field.
- i. The **White Zone** is defined as the 3' section along each sideline that must remain clear during play by the team's bench.

4. Playing the Game

- a. A **snap** is defined as the backwards handoff from the Center to another robot to start the play. This action turns the play from a "dead ball" to a "live ball".
- b. A **dead ball** is defined as when the play is stopped and no movement or turnover of the ball can occur.
- c. A **live ball** is defined as when the play is active and movement or turnover of the ball can occur.
- d. A **drive** is defined as the full period from when a team first took possession of the ball to when they gave possession back to the other team.
- e. A **turnover** is defined as when possession changes from the Offense to the Defense.
- f. A **handoff** is defined as a backwards pass of the ball from one Ball Carrier to another where the direction of travel is away from the Offense's End Zone.

- g. A **forward pass** is defined as a pass of the ball where the direction of travel is towards the Offense's End Zone.
 - h. A **Touch Catch** is defined as a pass that hits an eligible player/receiver but does not stay in the receiver's possession.
 - i. A **Retained Catch** is defined as a pass that hits an eligible player/receiver and the ball remains in possession of that player
 - j. **Player Possession** is defined by whether the ball is in contact with the Ball Carrier and fully inside of its footprint viewed from above.
 - k. The **Play Clock** is defined as the time keeping device which is used to determine if the offensive team has committed a delay of game penalty.
 - l. A **Set of Downs** is defined as a Team's allocated 4 attempts to gain a First Down.
 - m. A **First Down** is defined as a resetting of a Team's Set of Downs.
 - n. A **Turnover on Downs** occurs when a team is unable to gain a First Down in their 4 allocated attempts.
 - o. A **Fumble** is defined as loss of possession of a live ball by a ball carrying robot.
 - p. An **Interception** is defined as a Retained Catch by a Defender. Such a Retained Catch is not considered for Robot Points.
 - q. A **Deflection** is defined as a pass that contacts a Defender without the Defender retaining the ball.
 - r. A **Stiff Arm** is defined as the extension of any material beyond the perimeter of the base plate that impedes the ability of an opponent to contact a Player's base plate and thus block or tackle a Player.
5. **Scoring and Types of Plays**
- a. **Robot Points** are defined as points given to teams for completing Technical Challenges set forth by the CRFC.
 - b. **Football Points** are defined as all points pursuant to the regular rules of the NCAA.
 - c. A **Touchdown** is defined as an event when a team has possession of the ball in the opposing End Zone. This can be achieved by passing, rushing, interception, fumble recovery, or kick return.
 - d. A **Field Goal** is defined as a kick from the offense's current location on the field.
 - e. A **Safety** is defined as the Offense being tackled inside of their own End Zone which they are defending.
 - f. A **Point After Touchdown** is defined as the play following a Touchdown score where the scoring team can choose to either Kick through the uprights for 1 point or attempt an offensive play for 2 points.

- g. A **Kickoff** is defined as a play where the Kicking Team kicks the ball to the Receiving Team. This play is to start either half of the game. A Kickoff also occurs after any scoring play (Extra Point, Field Goal, Safety). The Receiving Team may have players back to receive the kick. If the Receiving Team catches the kick by Touch Catch, the ball is declared dead, and the team takes possession at the location of the catch. If the Receiving Team catches the kick caught by Retained Catch, the Player can move the ball down field until the Player is tackled, where the ball is declared dead and the team takes possession at that point. If the Kicking Team touches or retains the ball first, the ball is declared dead. If the Kicking Team's recovery occurred inside the Onside Recovery Zone, the Kicking Team takes possession at that spot. If the Kicking Team's recovery occurred outside the Onside Recovery Zone, the Receiving Team is given possession at that spot.
 - h. A **Punt** is defined as a play where the Offense sacrifices possession of the ball by kicking it down field. The Receiving Team may have players back to receive the kick. If the kick is caught by a Touch Catch, the ball is declared dead, and the Receiving Team takes possession at the location of the catch. If the kick is caught by a Retained Catch, the Receiving Team can move the ball down field until the player is tackled, where the ball is declared "dead," and the Receiving Team takes possession at that point. If the Kicking Team touches the ball first, the ball is declared "dead" and the Receiving Team takes possession at that spot.
6. **Player Positions**
- a. A **Quarterback (QB)** is defined as a player with the ability to throw a forward pass. A QB must also be a Ball Carrier.
 - b. A **Running Back (RB)** is defined as a player with the ability to receive a handoff from the Quarterback. A RB must also be a Ball Carrier.
 - c. A **Wide Receiver (WR)** is defined as a player with the ability to catch a pass from the Quarterback. A WR must also be a Ball Carrier.
 - d. A **Center (C)** is defined as a player capable of snapping the ball for the Offense. A C can not be a Ball Carrier and must have Ineligible Player Status Lights at all times.
 - e. An **Offensive Lineman (OL)** is defined as a player capable of blocking for the Offense. An OL can not be a Ball Carrier and must have Ineligible Player Status Lights at all times.
 - f. A **Defensive Lineman (DL)** is defined as a player who lines up on the LOS for the Defense. A DL may also be a Ball Carrier.

- g. A **Nose Tackle (NT)** is defined as a player who lines up on the LOS for the Defense. A NT may also be a Ball Carrier.
- h. A **Defensive Rover (DR)** is defined as a player who may line up anywhere on the Defensive side of the ball so long as they are not directly opposite any Offensive Player. A DR may also be a Ball Carrier.
- i. A **Defensive Back (DB)** is defined as a player who lines up behind the Secondary Offset Line for the Defense. A DB may also be a Ball Carrier.
- j. A **Kicker (K)** is defined as a player capable of kicking the ball by a mechanical kicking motion. A K must also be a Ball Carrier.

7. Technical Items

- a. A **Kill Switch** is defined as a form of safety mechanism used to completely shut off a Player.
- b. A **Bumper** is defined as a rubber edging surrounding the base plate of a Player.
- c. A **CRFC Node** is defined as the electronic board that determines when a player has been tackled, whether they are Eligible or Ineligible among other things defined in [Rule A.8](#). This board is provided to teams by the CRFC to ensure consistency between teams.

K. CRFC Penalties

1. Delay of Game

- a. 5' from the original Line of Scrimmage
- b. Replay the Down

2. Kicking Delay of Game

a. 1st Offense:

- i. 5' from the original Line of Scrimmage
- ii. Replay the Down

b. 2nd Offense:

- i. **FG Attempt:** Treated as a Missed Field Goal
- ii. **PAT:** Treated as a Missed Extra Point
- iii. **Kickoff:** Receiving Team takes possession at Midfield
- iv. **Punt:** Receiving Team takes possession at the current spot of the ball

3. Ineligible Player (*Aka: Ineligible Man Downfield, Illegal Touching*)

- a. 5' from the original Line of Scrimmage
- b. Loss of Down

4. False Start

- a. 5' from the original Line of Scrimmage
- b. Replay the Down

5. Offsides

- a. 5' from the original Line of Scrimmage
- b. Replay the Down

6. Illegal Formation

- a. 5' from the original Line of Scrimmage
- b. Replay the Down

7. Intentional Grounding

- a. Spot of the Foul
- b. Loss of Down

8. Illegal Hit

- a. Defensive
 - i. 5'
 - ii. Automatic First Down
- b. Offensive
 - i. 5'
 - ii. Loss of Down

9. Pass Interference

- a. Defensive
 - i. 10'

- ii. Automatic First Down
 - b. Offensive
 - i. 15'
 - ii. Loss of Down
- 10. Unsportsmanlike Conduct**
 - a. 1st offense
 - i. Warning
 - b. 2nd offense
 - i. 20' from the spot of the ball
 - c. 3rd offense
 - i. Immediate Ejection

L. Missing Robot Scenarios Appendix

The following appendix provides guidance for Teams and Officials when a Team is unable to field all eight Players. These scenarios are intended to clarify the practical effect of missing Players and do not supersede any rule contained in the sections above.

A Team may continue play with fewer than eight Players when it can safely and legally operate the Players available to it. The decision to continue play with a reduced lineup or forfeit remains with the Team; however, the officials may at their discretion call a forfeit on behalf of a team if they see fit.

1. Missing Center

- a. A Team missing only a Center may use a Quarterback to execute the backwards snap in place of the Missing Center. All other offensive formation requirements remain in effect.

2. Missing Quarterback

- a. A Team missing only a Quarterback may continue play using the Wildcat formation described in [Rule D.7.d](#). The Quarterback is not required to be on the field.

The Team may use a Running Back or Wide Receiver to receive the snap directly from the Center. All other Wildcat and offensive formation requirements remain in effect.

3. Missing Kicker

- a. A Team missing only a Kicker may continue normal offensive and defensive play. The Team may not attempt any kicking plays. All required kicking plays will be treated according to [Rule C.3.b.ii](#).

4. Missing Center and Quarterback

- a. A Team missing both their Center and Quarterback cannot legally begin an offensive play requiring a snap. The Team may continue to participate in kicking, defensive, and any other plays for which it can satisfy the applicable requirements.

5. Missing Center, Quarterback, and Kicker

- a. A Team missing their Center, Quarterback, and Kicker cannot legally operate any offensive or kicking plays. The Team may continue to participate in defensive plays. All required kicking plays will be treated according to [Rule C.3.b.ii](#). All required offensive plays will be given one full down of the play clock to field a legal play after which turnover of the ball will be forced and the team can continue playing defense.

6. General Principles

a. Forfeiture

- i. A Team may voluntarily forfeit rather than continue with a reduced lineup.
- ii. A Team is not required to forfeit as long as they are not fielding zero Players.
- iii. Officials retain the discretion to require a Team to forfeit if, in their judgment, the Team cannot safely or legally continue play for any period of time.

b. Legality

- i. Officials should determine legality based on the Players actually on the field and the requirements applicable to that play.
- ii. If a Team's available Players make a particular play or formation impossible to legally execute, the Team must use another legal play or formation.

c. Safety

- i. Safety requirements remain in effect regardless of the number of Players on the field.
- ii. Teams are continuously expected to maintain the highest degree of safety in repairing robots and in the quality of machine they return to the field of play.